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MONTANA CLINICAL COMMUNICATION AND SURVEILLANCE REPORT

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CARDIOVASCULAR HEALTH AND DIABETES PROGRAMS

Montana Department of Public Health and Human Services
Chronic Disease Prevention and Health Promotion Program
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APPLYING A DIABETES RISK SCORE TO STATE SURVEILLANCE DATA TO ASSESS RISK FOR DEVELOPING TYPE 2 DIABETES

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Department of Public Health & Human Services

BACKGROUND

In 2009, 7 percent of Montana adults (6 percent of whites and 14 percent of American Indians) reported a diagnosis of diabetes. However, many more may be at risk for developing undiagnosed type 2 diabetes. Having an estimate of the portion of the population at risk for having undiagnosed diabetes, and subpopulations at higher risk, can help target interventions and more effectively allocate resources.

The major source of health data between birth and death in Montana is the Behavioral Risk Factor Surveillance Survey (BRFSS). Several validated, "paper and pencil" diabetes risk tests are available; almost all of these require family diabetes history ascertainment.[1-3] The Rhode Island Diabetes Program was able to apply one of these, the Danish Diabetes Risk Score, after adding one question to assess family history of diabetes to the 2003 BRFSS questionnaire.[2, 4] Using this strategy, they determined that 23 percent

of the adult population of Rhode Island, aged 30 to 60, were at high risk for developing type 2 diabetes. One diabetes risk score, the Rotterdam Diabetes Risk Score (DRS), uses age, sex, obesity and use of hypertension medication to assess risk of having undiagnosed diabetes.[5] All of these measures are available in the 2009 BRFSS dataset. This report provides estimates of the proportion of Montanans aged 50 to 75 at risk for type 2 diabetes using the Rotterdam DRS.

Table 1: The Rotterdam Diabetes Risk Score (higher score means greater risk of type 2 diabetes)

	Point Value
Age	
50-54	0
55-59	2
60-64	4
65-69	6
70-74	8
75	10
Sex	
Female	0
Male	5
Presence of obesity	
No	0
Yes	5
Use of blood pressure medication	
No	0
Yes	4

METHODS

Rotterdam Diabetes Risk Score

The Rotterdam DRS was developed in a stratified random sample of participants of the Rotterdam Study aged 55 to 75. Using stepwise logistic regression analysis and variables usually accessible from medical charts, researchers created a model for predicting new-onset type 2 diabetes. The Rotterdam DRS was validated in the Hoorn Study of adults aged 50 to 74.[6]

Analysis

The Behavioral Risk Factor Surveillance Survey (BRFSS) is conducted each year in all 50 states, the District of Columbia and in three US territories, to assess the health status of the population. The core questionnaire is asked annually. Optional modules and state-added questions are asked every year or every other year. In odd years, the Hypertension Awareness Module asks the respondent if they have ever been told they have high blood pressure. If they respond "yes", they are asked if they take blood pressure medication. Thus, in odd years, the Montana BRFSS contains all the variables needed to apply the Rotterdam DRS to the population.

Because the Rotterdam DRS has only been validated in older populations, we restricted our analysis to Montana adults aged 50 to 75. Given that we are interested in assessing risk for diabetes, respondents that

self-reported being diagnosed with diabetes were excluded. Those who reported having gestational diabetes or pre-diabetes were included. Thus, our sample included 3,618 adult Montanans, aged 50 to 75, without known diabetes. We applied the Rotterdam DRS algorithm to create a risk score for each respondent. This risk score was dichotomized into "high" (7+) and "normal" (0-6) risk using the recommended cut point. Data were analyzed using SAS for Windows (release 9.1; SAS Institute Inc., Cary, NC) and SUDAAN (release 10.0; Research Triangle Institute, Inc., Research Triangle Park, NC) statistical software programs. To take into account sample design, sample weights were used in the estimation process. Standard errors were calculated using Taylor series linearization. The proportion at high risk was calculated for Montanans aged 50 to 75, and subgroups by race, income, health care insurance coverage, region of residence and educational attainment. Univariate logistic regression was used to calculate odds ratios and 95% confidence intervals.

Table 2: Demographic characteristics of adult respondents aged 50-75, without a diagnosis of diabetes, N=3,618, Montana BRFSS 2009.

Model Variables	
	Mean [95%CI]
Age	59.8 [59.5-60.1]
	% [95%CI]
Female	51 [49-53]
Obese (BMI $\geq$ 30 kg/m^2)	26 [24-28]
Blood pressure medication	30 [28-32]
Crosstab Variables	
	% [95%CI]
American Indian	4 [3-4]
Income	
<$50,000	56 [53-57]
$\geq$$50,000	45 [43-47]
Educational attainment	
<High school	5 [4-5]
High school graduate	31 [29-32]
>High school	65 [63-67]
Health care insurance coverage	
Yes	88 [87-89]
No	12 [10-13]
Resident of health planning region:	
1- Eastern	8 [7-9]
2- North Central	14 [13-15]
3- South Central	19 [18-21]
4- Southwestern	27 [25-28]
5– Northwestern	32 [30-34]

RESULTS

There were 3,618 respondents to the BRFSS survey without a diagnosis of diabetes,

Table 3: Percent of adult respondents aged 50-75, without a diagnosis of diabetes at high risk for developing undiagnosed diabetes using the Rotterdam DRS, Montana BRFSS 2009.

	% [95%CI]	OR [95% CI]
All	59 [57-61]	
Race		
American Indian	66 [56-75]	1.35 [0.89-2.05]
White	59 [57-61]	Ref.
Income		
<$50,000	63 [60-66]	**1.44 [1.21-1.72]**
≥$50,000	54 [51-58]	Ref.
Educational attainment		
<High school	69 [60-76]	**1.58 [1.06-2.36]**
High school graduate	61 [57-64]	1.12 [0.93-1.35]
>High school	58 [55-60]	Ref.
Health care insurance coverage		
Yes	61 [58-63]	Ref.
No	49 [43-55]	**0.63 [0.48-0.81]**
Resident of health planning region:		
1- Eastern	59 [54-65]	1.02 [0.78-1.35]
2- North Central	62 [56-67]	1.15 [0.87-1.52]
3- South Central	59 [54-64]	1.01 [0.78-1.31]
4- Southwestern	59 [55-63]	1.01 [0.81-1.25]
5– Northwestern	59 [55-62]	Ref.

aged 50 to 75 years. Half of respondents were female, about one-quarter were obese, and about one-third reported taking blood pressure medication (Table 2). Only 4 percent of respondents were American Indian. Two-thirds of respondents had attended some college or were college graduates and the majority of respondents had health care coverage.

When the result from this Rotterdam DRS assessment of the 2009 Montana BRFSS respondents is extrapolated to the Montana population, 150,000 adults aged 50 to 75 are estimated to be at high risk for developing undiagnosed type 2 diabetes. (Table 3). Sixty-six percent of Montana American Indians in this age group were at high risk for diabetes, though this estimate was not statistically higher than that for whites. In univariate analysis, having income less than $50,000 per year, having less than high school education, and having health care insurance coverage

were all associated with high risk for developing undiagnosed diabetes (Table 3). Adjusting for all variables, only income and health care insurance coverage were associated with high risk for diabetes.

DISCUSSION

Using the Rotterdam DRS, nearly two-thirds of the adult population aged 50 to 75 in Montana in 2009, was at high risk for developing diabetes. The risk for American Indians did not differ from that for whites. However, the proportion of American Indians in our sample was smaller than the proportion of American Indians in the state. Since the prevalence of diabetes is higher in Montana Indians, a larger portion of the American Indians in the greater BRFSS sample were excluded from our sample due to prevalent diabetes.

Persons with an income less than $50,000 dollars per year and persons with health care insurance coverage were more likely to be at high risk for diabetes compared to persons without these traits. The association of health care insurance coverage with diabetes risk seems paradoxical. However, persons over age 65 are eligible for Medicare. Therefore, lack of health care insurance coverage is associated with younger age. Age is the major component of the Rotterdam DRS, so younger age means lower diabetes risk in this estimation. Higher income is also associated with lower age, thus the association of income and diabetes risk is probably due to the age component of the Rotterdam DRS.

There are several limitations to this approach. First, the Rotterdam DRS is only validated for a population aged 50 to 75, therefore our analysis is limited to this age group. Likely, there is a sizable portion of Montanans under age 50 that are at risk for developing type 2 diabetes, particularly as the prevalence of obesity increases. This may be especially important to American Indian communities, as the proportion of diabetes cases in American Indians diagnosed in persons aged under 50 and under 40 is higher than the proportion of cases diagnosed in younger whites. Diabetes risk scores validated in populations under age 50 require assessing family history of diabetes in first degree relatives, information for which is not included in the core BRFSS questionnaire or modules, though it could be added to the questionnaire at the state level as was done in Rhode Island. Second, the Rotterdam DRS was developed and validated in a Northern European population and does not take race-based susceptibility to diabetes into account.

Thus, it may be of limited utility for assessing diabetes risk among American Indians.

If we were to screen all of the estimated 153,000 Montanans found to be at high risk for developing undiagnosed diabetes using this algorithm with an oral-glucose tolerance test, it is estimated that we would find approximately 10,000 people with undiagnosed diabetes. The remaining 143,000 people would be at high risk for developing type 2 diabetes and potential candidates for a primary diabetes prevention lifestyle intervention program.

This estimation further underscores the great burden of diabetes risk in the older adult Montana population. To intervene effectively on this population, the public health system must employ an "all hands on deck" approach using every available resource for lifestyle intervention.

The Montana Department of Public Health and Human Services currently funds 8 primary and 2 telehealth sites offering an intensive lifestyle intervention program based on the Diabetes Prevention Program model.[7] Up to four additional sites are planned to be added in the coming months with hopes to continue adding more sites in the future. For more information on the Montana Cardiovascular Disease and Diabetes Prevention Program, contact Diane Arave at darave2@mt.gov.

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Www.dphhs.mt.gov/PHSD

SAVE THE DATES

Big Sky Pulmonary Conference
Team Based Pulmonary Care: Best Practices and Emerging Research
Big Sky, MT—Huntley Lodge
March 17-19, 2011
Contact Katie Loveland at kloveland@mt.gov

Montana Cardiovascular Health Summit
Best Western Helena Great Northern Hotel-Helena, MT
April 8, 2011
Contact Crystelle Fogle at cfogle@mt.gov

Worksite Wellness Workshop
Location: TBD
May11, 2011
Contact Linda Krantz at lkrantz@mt.gov

Montana Diabetes Conference 2011
Best Western Helena Great Northern Hotel-Helena, MT
October 13-14, 2011
Contact Susan Day at sday@mt.gov

MAADE Annual Meeting
Best Western Helena Great Northern Hotel-Helena, MT
October 13, 2011
Contact Colleen Karper at 406-751-5454

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WHAT ARE THE MONTANA DIABETES PREVENTION AND CARDIOVASCULAR HEALTH PROGRAMS AND HOW CAN WE BE CONTACTED?

The Montana Diabetes Control and Cardiovascular Health Programs are funded through cooperative agreements with the Centers for Disease Control and Prevention and Health Promotion (1U58DP001977-01), the Division for Heart Disease and Stroke Prevention (5U50 DP000736-05) and through the Montana Department of Public Health and Human Services.

The mission of the Diabetes Control and Cardiovascular Health Programs is to reduce the burden of diabetes and cardiovascular disease among Montanans. Our web pages can be accessed at http://www.diabetes.mt.gov and http://montanacardiovascular.mt.gov.

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